NE
MISC

Forestry Sciences Laboratory

A Center for Hardwood Resources Research

Princeton, West Virginia

U. S. Department of Agriculture
Forest Service
Northeastern Forest Experiment Station

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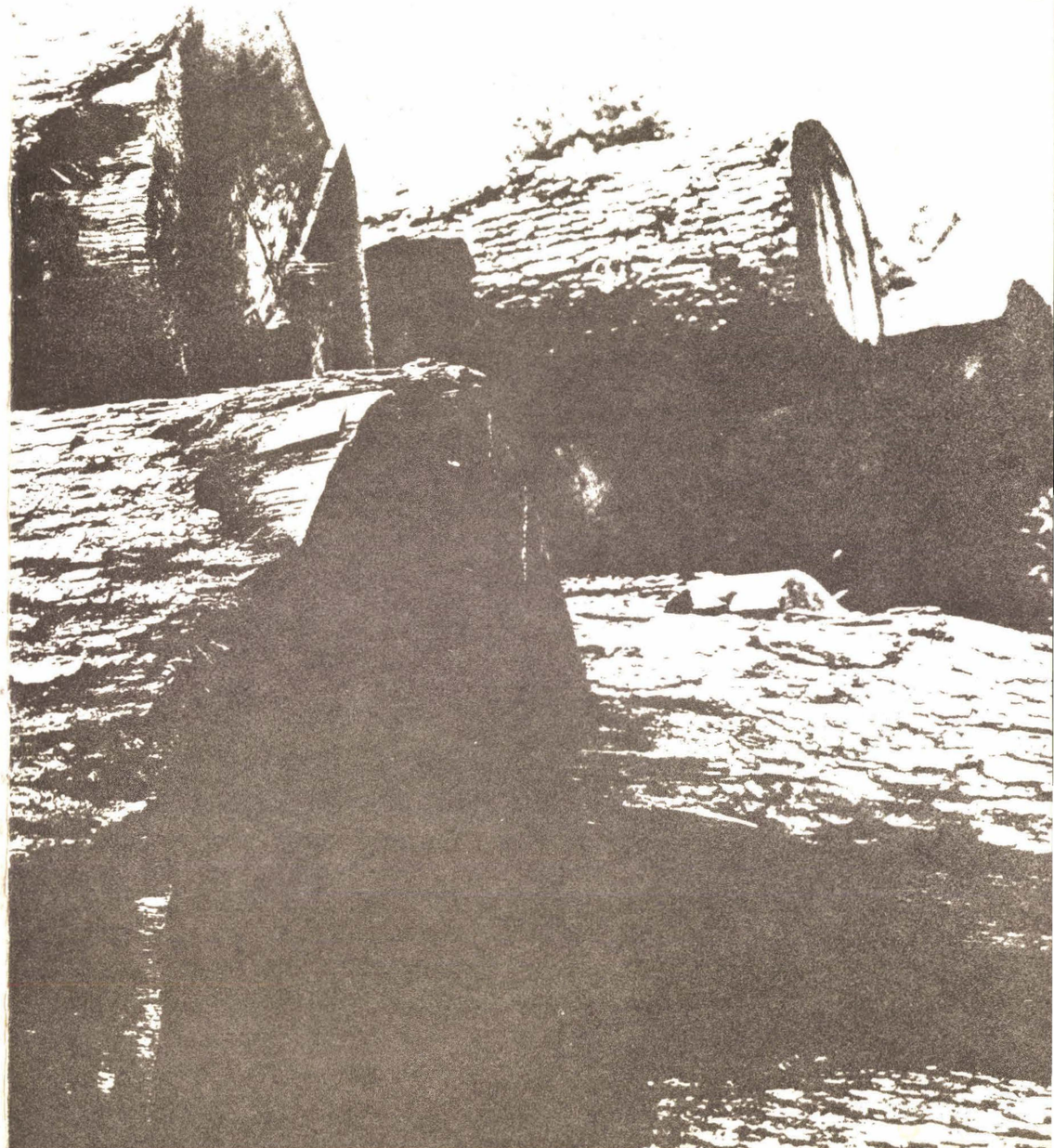

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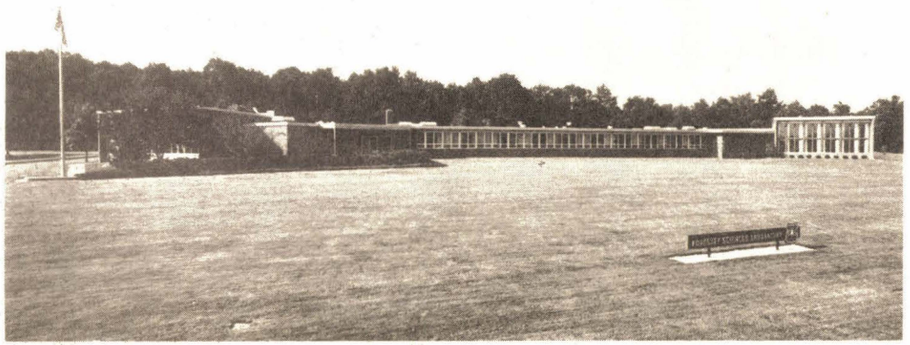
Broomall, Pennsylvania 19008

The Forest Service maintains 154 national forests and 19 national grasslands. Each year these lands provide about 10 billion board feet of timber, recreation for millions of people, grazing for several million cattle and sheep, and watershed protection for thousands of communities. Research provides the scientific basis for decisions on how to manage these diverse resources. Increasing the timber supply; protecting water resources; fighting fire, insects, and disease; providing for wildlife and recreation all are important goals—and all are in demand by the various groups who guide and support Forest Service programs.

The research at any one laboratory is usually geared to the needs of that area, hence the Princeton lab's emphasis on timber utilization and marketing problems in the eastern United States. In addition to their own research efforts, they maintain close contact with forestry departments of colleges and universities, with other agencies at the local, state, and federal level, and with forest industry companies and associations. Often the researchers cooperate directly with one of these groups on a research project.

America's forests are changing. But the people at Princeton are trying to ensure that we have the techniques and processes needed to handle changing demands. If we use our forest resources well, we'll have a plentiful supply of timber for all time.

The Forest Service facility, completed in 1963, was built near the ghost site of a sawmill, in an area where livelihoods seem ever tied to wood.



America's forests are constantly changing. Years ago our forests were full of large, old trees. Today's forests contain mostly young or middle-aged trees. In either case, people's need for the products of a forest — wood, water, and recreation — can be met by careful use of the resources and proper management of forest land. To adapt to a changing forest, we need to change present harvesting and processing methods.

Of the two general types of wood — hardwood and softwood — we now use five times as much softwood as hardwood. But the demand for softwoods is rapidly approaching the available supply. The Forest Service estimates that future softwood demand will exceed the supply, and that we will have to use hardwoods to fill the gap.

Finding use for unused wood resources is the Princeton Lab's goal. One such untapped resource was this 50 year old stand of Allegheny hardwoods, which when thinned yielded wood for construction, paper products and fuel.

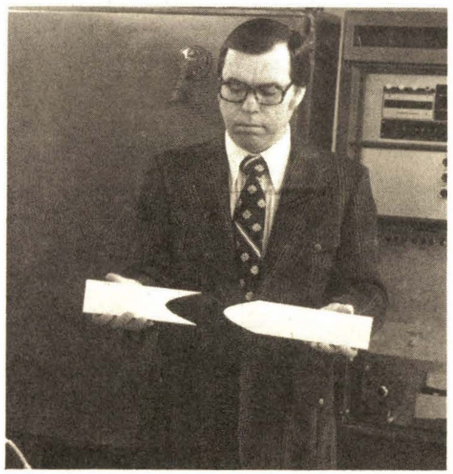
Although hardwoods are growing at about twice the rate they are being harvested, much of the surplus wood is in small trees or trees of poorer quality. Another largely unused wood resource is the residue from harvesting timber or clearing land. Finding ways to use this surplus wood and to use all wood more efficiently is a challenge for today's researchers, forest managers, and wood processors.

The men and women of the Forestry Sciences Laboratory in Princeton, West Virginia, are part of the Forest Service effort to improve the way we use our timber resources. Since its inception in 1963, research at the laboratory has concentrated on improving efficiency in the use of hardwood timber for lumber, crossties, pallets, mine timbers, and other products that are important to the American economy. Recently, the research program has been revised to focus more directly on the underused elements of the hardwood resource. Laboratory researchers are divided into three units, called projects, each of which covers a different area of research.

Researchers in one project study ways to increase the nation's supply of hardwood raw materials. They determine the amounts and types of products that can be made from currently unused logging residues and from small trees removed during thinnings and improvement cuttings. Since some of this wood is suitable only for fuel, researchers are investigating the potential for using residue wood for heating homes, schools, hospitals, and similar institutions and for use by small industries. The heating system for the laboratory methods testing plant is being redesigned to use wood fuel, and will serve as a testing and demonstration unit for this research.

Other research is aimed at developing efficient methods for harvesting and processing wood from residues and thinnings. Most present methods were developed for larger, higher grade timber, and do not handle small roundwood efficiently.

Much of our hardwood timber is classified "low grade" because of its small size, and because it contains knots and other defects. About two of every three hardwood boards have defects that limit their use in high value products like furniture. But both the logs and lumber contain sections of clear, high quality wood. Researchers in another project are developing new technology for using more low grade hardwoods for furniture and similar products. Their task is to learn how to efficiently recover and use high quality wood from low grade hardwood logs and lumber. To this end, researchers have discovered and tested a new end-joining method called "Serpentine End Matching" (SEM). SEM allows manufacturers to glue useable, high quality panels from the clear portions of low grade lumber. The SEM joints blend with natual wood grain features and give the appearance of defect-free wood. By permitting better use of low grade wood, this process will help extend the supply of high quality wood.



A perfect fit makes two short pieces look like one, thanks to Serpentine End Matching (SEM), a process developed at Princeton by researcher Charles Gatchell and co-workers.

Engineer Hugh Reynolds shows a reconstructed low grade log that was sawed into two-sided cants and then into boards. Waste wood will be used for energy.

The Princeton laboratory occupies an area that in the early 1900's was the site of a large sawmill and a thriving community called Gardner populated by mill workers and loggers. By 1917, most of the old growth timber in the area had been harvested, so the mill was dismantled and Gardner gradually disappeared. Today, the only reminders of the past are a white clapboard church and a few old mill foundations.

The main laboratory facility was completed in 1963 and a new wing was added in 1975. The building contains a total of 34 offices, an auditorium, library, conference room, projection and storage room, computer terminal, and photolab.

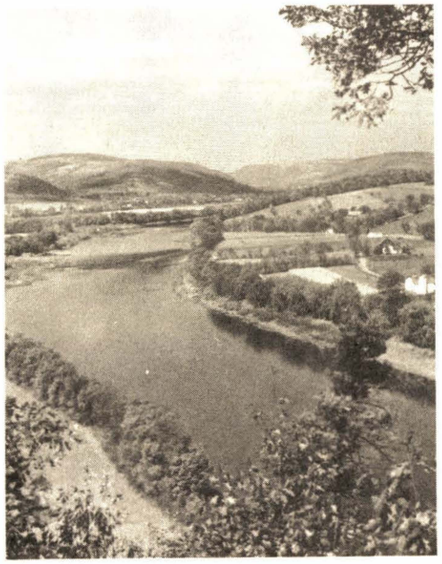
The research involving actual wood processing takes place in the methods testing plant. Here new or improved processing techniques are developed and tested before they receive commercial application. The adjacent experimental wood yard includes an air-drying yard, solar-assisted low temperature dryer, and a dry kiln.

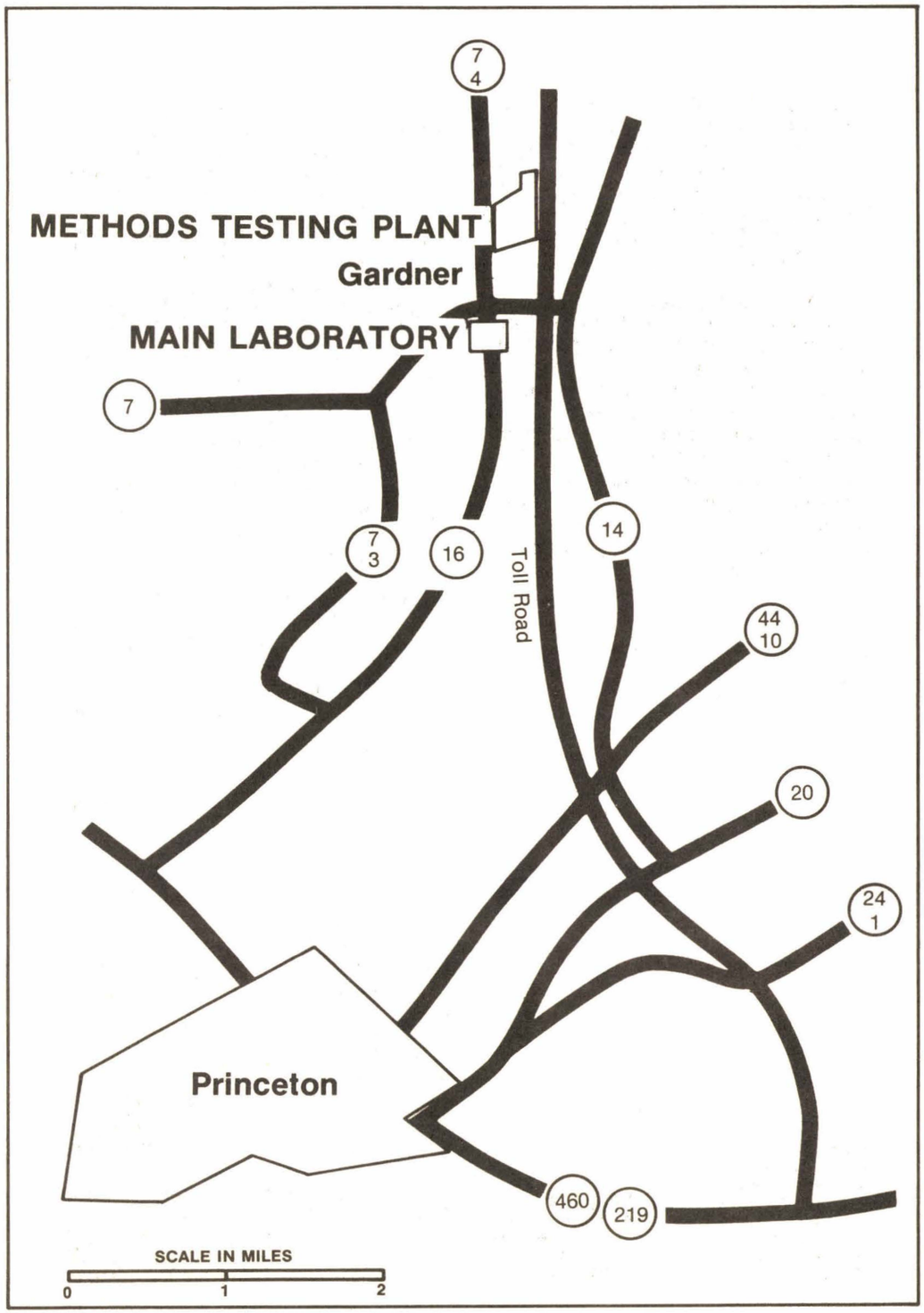
Map of Princeton Laboratory vicinity.

Where timber stands are small and scattered, increased productivity is crucial to our nation's future wood supply.

A tribute to the lab's mission is the extensive use of wood in the building's walls and floors. The lobby is paneled in native Appalachian hardwoods, including butternut, American elm, red oak, and hickory. Each office features a different species with floors of beech, maple, oak, and cherry. The auditorium walls are paneled with Appalachian cherry wood, while the laminated ceiling beams come from oak grown in eastern Kentucky.

The Princeton lab is one of 14 research facilities in the northeast. Employees in these locations deal with other aspects of forestry research—insect and disease control, urban forestry, silviculture, and genetics, for example. The labs collectively are the Northeastern Forest Experiment Station, part of the Forest Service, U. S. Department of Agriculture. Headquarters for the Northeastern Station is at Broomall, Pa.

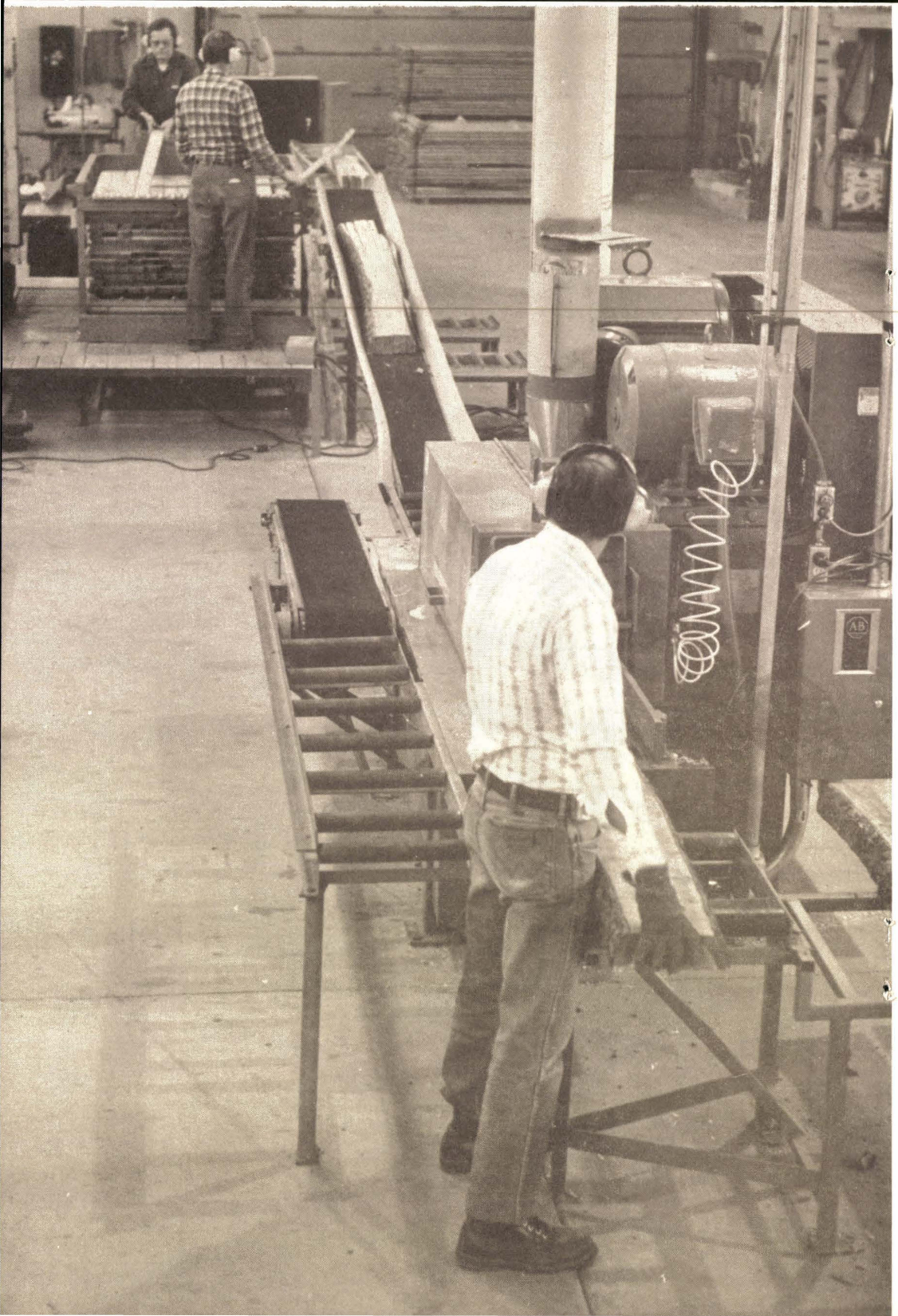



METHODS TESTING PLANT
Gardner
MAIN LABORATORY
7
4
7
7
3
16
Toll Road
14
44
10
20
24
1
Princeton
460
219
SCALE IN MILES
0
1
2

Other utilitzation researchers are perfecting a process to convert low grade logs or bolts directly into parts for furniture and other woodworking industries. In this system, wood not suitable for parts or for the SEM process will be used for fuel.

Finally, wood utilization researchers are investigating the mix of sizes of individual parts that go into making furniture, kitchen cabinets, and other wood products. Their goal: to determine whether part sizes can be standardized and limited in number. If a standardized system can be established, parts can be cut and stored for specific uses, and lumber processing waste (and costs) can be reduced.

Another project is investigating opportunities to improve productivity of the primary forest industry. Researchers in this project study ways to increase the efficiency of labor and capital in timber harvesting and processing, and economic and technical efficiency of hardwood use in manufactured products. In some cases, the life of a product can double if the right raw materials and proper product design are used. The researchers also look for ways to substitute less desirable species where only preferred species have been used. The opportunity for innovation is great, since the less desirable species comprise about 65 percent of available hardwood timber. Project economists are developing methods for estimating future demand and prices for hardwood products. They also help owners of small private forests use their land productively, and suggest ways to reclaim surface mined land in forested areas to the best use.



From cants to kitchen cabinets . . . workers at Princeton use new technology to resaw low grade logs into strips which are stacked for drying.

Safety is studied at Princeton as one of many ways to improve productivity of forest industries.